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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	**Kim et al.**	**GROUP:**	1765
SERIAL NO:	10/023,047	**EXAMINER:**	Unknown
FILED:	**12/13/2001**		

FOR: **METHOD OF PRODUCING DEVICE QUALITY (A1) InGaP ALLOYS ON LATTICE-MISMATCHED SUBSTRATES**

Box Non-Fee Amendment
Assistant Commissioner of Patents
Washington, D.C. 20231
Sir:

PRELIMINARY AMENDMENT

Preliminary to examination, please amend the above-identified application as follows:

IN THE SPECIFICATION:

Please amend the following sponsorship information at page 1, line 9 as follows:

(Amended) This invention was made with government support under Grant No. DAAG55-97-1-0111 awarded by the [United States Army] Army Research Office. The government has certain rights in the invention.

REMARKS

The present amendment is submitted in order to provide the appropriate sponsorship information.

Respectfully submitted,

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I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited on the date shown below in an envelope with the United States Postal Service as first class addressed to the Assistant Commissioner of Patents, Washington, D.C. 20231.

Emily C. Porell — Emily C. Porell

07/24/2002 — Date

METHOD OF PRODUCING DEVICE QUALITY (Al)InGaP ALLOYS ON LATTICE-MISMATCHED SUBSTRATES

PRIORITY INFORMATION

This application is a continuation of Ser. No. 09/499,217 filed November 24, 1999, which claims priority from provisional application Serial No. 60/109,619 filed on November 24, 1998.

BACKGROUND OF THE INVENTION

This invention was made with government support under Grant No. DAAG55-97-1-0111 awarded by the Army Research Office. The government has certain rights in the invention. The invention relates to the field of producing device quality (Al)InGaP alloys on lattice-mismatched substrates.

Epitaxial graded composition buffers of $In_xGa_{1-x}P$ on GaP substrates ($In_xGa_{1-x}P$/GaP) are promising substrates for high performance optoelectronic devices. $In_xGa_{1-x}P$ alloys with large bandgaps that are difficult or impossible to achieve lattice-matched to GaAs substrates can be grown on graded buffers, providing direct bandgap emission of the critical green to orange wavelengths that lie between the capabilities of GaN-based and GaAs-based light emitting diode (LED) and laser diode technologies. $In_xGa_{1-x}P$/GaP substrates are also inherently transparent to devices grown on them, which roughly doubles light extraction efficiency in LEDs compared to absorbing substrates such as GaAs. The transparency of $In_xGa_{1-x}P$/GaP has also been used to produce negative electron affinity GaAs and InGaAs photocathodes that operate in transmission mode, and a variety of other optoelectronic detectors and modulators can be envisioned to take advantage of a transparent semiconductor substrate. Furthermore, GaP is nearly lattice-matched to Si, so $In_xGa_{1-x}P$/GaP is one natural choice for integrating compound semiconductor devices on Si substrates.

Graded buffers are grown to efficiently relieve lattice-mismatch strain between substrates and films of differing lattice constants. For most optoelectronic device applications, direct bandgap compositions of $In_xGa_{1-x}P$ are desired. The >2% lattice-mismatch between GaP and direct bandgap compositions of $In_xGa_{1-x}P$